

Module 3 Lesson A: Soil Fundamentals

Student Data Collection Worksheet for Module 3 HOA A

Use the following sections to record data and observations for each activity. Be clear and organized – you will use this information to answer questions and during class discussions. Remember to include units (e.g., cm, minutes, g/cm³, pH units) where appropriate.

Data: Soil Texture by Feel (Activity A1)

Soil Texture Results: Record your findings for each soil sample you tested. Describe how it felt and what texture you determined.

Sample ID/Location	Ribbon Length (cm)	Texture Class Result	Feel Description (gritty, sticky, etc.)
Sample 1: _____			
Sample 2: _____			
Sample 3: _____			

Reflection Questions (A1):

1. What texture class did you identify for each sample? Briefly describe what clues led you to that conclusion (for example, "Sample 1 made a 5 cm ribbon and felt very sticky, so I classified it as clay loam.").
2. How do you expect the texture of a soil to affect its ability to hold water and allow water to infiltrate? For instance, which type of soil would likely drain faster, sandy or clayey soil, and why?
3. Consider real-world implications: If a farmer has very sandy soil, what might they do to improve its water retention? If they have heavy clay soil, what might they do to improve drainage?

Data: Soil pH (Activity A2)

pH Measurements: Record the pH readings for each soil sample location. If you did multiple trials for accuracy, include them and calculate the average pH.

Location / Sample	pH Trial 1	pH Trial 2	pH Trial 3	Average pH	Category (Acidic/Neutral/Basic)
Location 1: _____					
Location 2: _____					
Location 3: _____					

(Add more rows if you tested more samples.)

Reflection Questions (A2):

1. Which soil sample had the lowest pH (most acidic)? Which had the highest pH (most alkaline)? Provide the values.
2. Propose some reasons why the pH might be different between your sample locations. Consider factors like plants growing there (pine needles can make soil acidic), additions (fertilizer, lime), or soil parent material (chalky rocks make soil basic).
3. Why does soil pH matter for plant growth and nutrient availability? Give one example of a nutrient that becomes less available in acidic soils and one way farmers or gardeners adjust soil pH to help plants.

Data: Soil Infiltration (Activity A3)

Infiltration Test Results: Record the time it took for water to infiltrate at each location. If you did multiple measurements (e.g., a second inch of water), record those as well. Calculate the rate if instructed.

Test Location / Soil Condition	Time for 1 inch of water (min:sec)	Infiltration Rate (inches/hour)	Observations/Notes
Location A: _____			
Location B: _____			

If a second 1-inch application was done, you can note "Second inch took X min" in the observations, or add another column.

Reflection Questions (A3):

1. Which location had a faster infiltration rate? Quantify the difference (e.g., "Location A absorbed 1 inch in 3:00 minutes, while Location B took 8:30 minutes").
2. What factors do you think caused the difference in infiltration between the sites? Consider soil texture, compaction, plant cover, moisture, etc., that you observed.
3. What could happen in heavy rain if the soil has a very **slow** infiltration rate? What problems might occur on the surface? Conversely, what might be a concern if a soil's infiltration rate is extremely **fast** (water goes straight through)?
4. Think broadly: How does improving soil structure (through organic matter, roots, etc.) influence infiltration? How might this relate to preventing things like flooding or erosion in a real ecosystem or farm?

Data: Soil Bulk Density & Moisture (Activity A4)

Bulk Density Measurements: Record your measurements and calculations for the soil core sample(s).

Sample Location	Wet Soil Weight (g)	Dry Soil Weight (g)	Soil Volume (cm ³)	Bulk Density (g/cm ³)	Moisture Content (%)
Sample 1: _____			(e.g. 347 cm ³)		
Sample 2: _____			(e.g. 347 cm ³)		

(Volume: if using the standard ring, ~347 cm³; use actual volume if different.)

Reflection Questions (A4):

1. What is the bulk density of your soil sample(s)? Based on the soil's texture, do you think this bulk density indicates a **well-structured soil** or a **compacted soil**? (For example, a loam soil with BD 1.3 g/cm³ is typical, but 1.7 g/cm³ would be quite high and likely compacted.)
2. How much water (in %) did your soil contain? Was this higher or lower than you expected? What might explain a high moisture percentage (think about recent weather or organic matter content)?
3. Why is bulk density important for plant roots and soil organisms? Describe what a high bulk density means for pore space and air in the soil (aeration).
4. Name one farming or gardening practice that can reduce soil compaction (lower bulk density) and improve aeration. How does this practice work to improve the soil structure?